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III. *Rules for Resolving two Cases in Oblique Spherical Trigonometry*, by WILLIAM CROSWELL, A. M. *Teacher of Navigation.*

GIVEN two sides of an oblique angled spherical triangle and the included angle, required the third side.

R U L E.

Add together the cosecant of half the included angle, the half cosecants of the including sides, and the sine of half the difference of the sides; the sum will be the tangent of an angle, the cosecant of which being added to the sine of half the difference of the sides, the sum will be the sine of half the required side.

Example. Let the including sides be, one $82^{\circ} 16'$, and the other $62^{\circ} 40'$, and the including angle $127^{\circ} 08'$, and let it be required to find the other side.

2) $127^{\circ} 08'$ Half difference of including sides $9^{\circ} 48'$

63 34	Cosecant.	0 04798	
62 40	Half Cose.	0 02571	
82 16	Half Cose.	0 00199	
9 48	Sine.	9 23098	9 23098
<hr/>			
111° 27' &c.	Tangent.	9 30666	Corref. Cose. 0 70209
<hr/>			
		59° 00	Sine. 9 93307
		2	
<hr/>			
		118 00	Side required.

By this rule, mutatis mutandis, when two angles, and the included side are given, the third angle may be found :—and by reverfing this rule, when three sides are given, an angle may be found.

GIVEN the apparent distance of the moon from the sun, or a fixed star ; and also the apparent and true altitudes of the objects ; required their true distance.

R U L E.

To the apparent distance, add the difference of the apparent altitudes, and take half the sum : also, from the apparent distance, subtract the difference of the apparent altitudes, and take half the remainder ; then add together the half cosecants of the half sum, and half remainder, the reserved logarithm, and the sine of half the difference of the true altitudes ; the sum will be the tangent of an angle, the corresponding cosecant of which being added to the sine of half the difference of the true altitudes, the sum will be the sine of half the true distance.

Example. Moon's apparent altitude $12^{\circ} 30'$. True altitude $13^{\circ} 20' 42''$. Star's apparent altitude $24^{\circ} 48'$. True altitude $24^{\circ} 45' 57''$. Apparent distance $51^{\circ} 28' 35''$. Required the true distance.

$$\begin{array}{r}
 24^{\circ} 48' \\
 12 \ 30 \\
 \hline
 12 \ 18 \text{ Difference of apparent altitudes.} \\
 24^{\circ} 45' 57'' \\
 13 \ 20 \ 42 \\
 \hline
 2) \ 11 \ 25 \ 15 \\
 \quad 5 \ 42 \ 38 \text{ Half difference of true altitudes.} \\
 51^{\circ} 28' 35'' \text{ Apparent distance} \quad 51^{\circ} 28' 35'' \\
 12 \ 18 \ 00 \text{ Differ. of appar. altitudes} \quad 12 \ 18 \ 00 \\
 \hline
 2) \ 63 \ 46 \ 35 \\
 \quad 31 \ 53 \ 18 \text{ Half sum.} \\
 \hline
 \end{array}
 \qquad
 \begin{array}{r}
 2) \ 39 \ 10 \ 35 \\
 \quad 19 \ 35 \ 17 \text{ Half rem.} \\
 \hline
 \text{Reserved}
 \end{array}$$

Reserved log.				68	
Half sum.	31° 53' 18"	Half cose. o	13857		
Half rem.	19 35 17	Half cose. o	23731		
Ha. diff. of t. al.	5 42 38	Sine.	8 99783	8 99783	
	13° 19' &c.	Tangent.	9 37439	Cose. o	63745
				25° 34' 56"	Sin. 9 63528
				2	
				51 9 52	True distance.

Instead of finding the seconds in the arc answering to the above tangent, the corresponding cosecant is found at once by the following proportion : as the difference between the next greater, and next less tangents, to the difference between the corresponding cosecants, so is the difference between the given tangent, and the next greater, to a fourth number, which must be added to the least of the corresponding cosecants.



IV. *Observations of an Annular Eclipse of the Sun, at Cambridge, April 3d, 1791, by SAMUEL WEBBER, A. M. Hollis Professor of Mathematicks and Philosophy in the University at Cambridge.*

EXPECTING an annular eclipse of the sun, on the third of April, I previously took corresponding altitudes of the sun with a transit instrument, in order to ascertain, with all the precision in my power, the going of the clock, which belongs to the University. But, the day before the eclipse happened, the clock unfortunately stopped, for want of some repairs,